

## Cell Growth Enhancement



In the accompanying photos, laboratory technicians of Exogene Corporation, Monrovia, California are engaged in bioprocessing experiments. A company formed in 1987, Exogene teams with pharmaceutical, biotechnology and chemical companies in applications of Exogene's advanced technologies to enhance production of bioprocessed substances, such as proteins, antibiotics and amino acids.

A long standing problem in bioprocessing is ensuring adequate oxygen to achieve the desired cell growth and productivity; cells starved for oxygen often create compounds that inhibit or even terminate cell growth. Where efforts to improve oxygenation usually focus on increasing the amount of oxygen transported to the cell, Exogene takes an entirely new approach to the problem: it employs genetic modification of the cells to enable synthesis of a novel hemoglobin molecule that allows the cells to use the available oxygen more efficiently, resulting in higher product yields.

Another Exogene innovation is an oxygen-sensitive genetic switch, or promoter, that facilitates increased production of pharmaceutical proteins. The promoter provides high levels of protein synthesis while eliminating some of the problems and costs associated with traditional promoter systems.

These and other Exogene technologies originated in research performed for NASA's Jet Propulsion Laboratory by Professor James E. Bailey and Chaitan Khosla of the California Institute of Technology (Caltech) Chemical Engineering Department. In the latter 1980s, Bailey and Khosla conducted extensive experiments in cell growth through production of hemoglobin as a way to improve oxygen supply to cells. Exogene was granted a worldwide exclusive license to commercialize the Caltech work.

By improving the efficiency of oxygen use by the cells, Exogene says, major operational expenses associated with oxygen transfer can be reduced. Greater product yields result in decreased raw material costs and more efficient use of capital equipment. Increased concentrations can lower downstream processing costs and, with fewer batches needed to meet manufacturing requirements, quality control costs are also reduced. The company cites a broad range of applications for its core technologies, including a variety of products and processes in the areas of biotechnology, pharmaceuticals, specialty chemicals and waste treatment. ●

